

A better chance of seeing them could hardly be. They were at all times to be away from the sun's light, and when nearest to the earth not more than one-fifth the sun's distance. The paths were carefully computed, and the action of all the planets, notably that of Jupiter, allowed for. A dozen observers for months swept the heavens with their telescopes, but not the slightest trace of the comets was seen.

Again, they should have come to perihelion a year ago last autumn (Oct. 6, 1872), but, as I suppose, neither of them was seen. With the loss of its hero, our story would seem to come to an end. I must ask your indulgence, however, for another chapter.

I suppose that each one of you has often seen a shooting-star. On a clear night you have seen a bright point of light travel quickly across the sky, as though a star had been shot from its place in the firmament. It may, if it was a large one, have broken into sparks as it disappeared, or have left a cloudy train along part of its path for an instant; or perhaps it was so faint even that you could not be quite sure that you saw anything. Some of you have seen those shooting-stars by hundreds in star showers.

Until near the close of the last century, poets dreamed, and other men guessed, about these objects, but knew nothing. Two German students, Brandes and Benzenberg, found out, and told us, that these bright flights were in the upper parts of the atmosphere. From the two ends of the city a track always appeared to be in the same part of the heavens. But when one went to a village many miles away, a track was seen by the two persons (at A and B, Fig. 8), in different parts of the sky. Hence they were able to measure the height of the shooting-stars from the ground.

We now know that these luminous paths are rarely less than 40 miles or more than 90 miles from the earth. We also know that any shooting-star was a small body, of unknown size, perhaps not larger than a pebble or a grain of coarse sand even, undoubtedly solid, which has been travelling around the sun in its own independent orbit, like any planet or comet. Its path came within 4000 miles of the earth's centre, and so the small body struck into the earth's atmosphere. Its velocity was so great—fifty or a hundred times that of a cannon-ball—that even in our rare upper atmosphere an intense light and heat was developed by the resistance, and the body was scattered in powder or smoke. These bodies before they come into the air, I call meteoroids. It is only when they have reached our atmosphere and begin to burn that we ever see them. They are then within 90 miles of the ground.

(To be continued.)

ON THE COAGULATION OF BLOOD¹

BRÜCKE'S researches on the conditions of coagulation of blood have shown that, on the one hand, contact with foreign bodies makes blood coagulate, and, on the other, that contact on all sides with the fresh vascular wall obviates coagulation (Durante). Lacker has proved the influence of foreign bodies on blood-coagulation by microscopic observation of coagulation in its first stages. In partial contradiction to these results was the observation of Grünhagen that blood, when received into glycerine, and so long as it did not mix, remained liquid. To determine the nature of these influences the following experiments were made. Blood was drawn under oil from the carotid artery of a dog, and let stand at ordinary indoor-temperature; after twenty-four hours it was *not* coagulated. Then the blood was drawn into a vessel smeared inside with vaseline, and it *too did not coagulate*. When it was stirred with an oiled glass rod, no fibrin was separated; but when, even after several hours, part of

this blood was poured into an ungreased vessel, it coagulated in a few minutes. Moreover, contact with an ungreased glass rod sufficed to make the blood in the greased vessel coagulate outwards from the rod.

Further experiments showed that the drying of the upper layers of the blood, and the presence of small quantities of dust, caused coagulation even in the greased vessel; if this was guarded against, the blood remained liquid for days, and the corpuscles sank to the bottom, the plasma remaining as a clear liquid above.

After pouring out the blood, the greased walls of the glass vessel showed neither blood-colouring matters, nor traces of a separated albuminous body. A repetition of these experiments at 37° C. gave the same result. In all the experiments blood was also, for comparison, drawn off into ungreased vessels, and in all these it coagulated, at the most, in a quarter of an hour.

In further experiments a small vaseline-lined glass tube was used as a canula; and the blood drawn through this into vaseline-lined vessels also remained uncoagulated.

When the outer orifice of a canula inserted in the carotid was closed, the blood column in it pulsated, without showing the least sign of coagulation even after two hours.

In all these experiments there was nowhere in the vessels with which the blood came into contact even a point for adhesion—such a point would have caused in shorter or longer time coagulation of the whole mass of blood. Thus the coagulative influence of foreign bodies appears to be due to their adhesion.

But to demonstrate that the anti-coagulative property of the vascular walls is due to the lack of adhesion, a further series of experiments was made with soaked fish-bladders and parchment-tubes.

The membranes lay several hours in 0.6 per cent. chloride of sodium solution; the blood was drawn off through a vaseline-lined canula into the bladders and tubes, which were then so hung in a litre of the salt-solution that the mass of blood was under the surface. In these experiments also the blood remained liquid, the surrounding salt-solution having no coagulative effect, while some of the blood, poured after twenty-four hours into an ungreased porcelain vessel for comparison, soon coagulated. Like the blood-vessels, which, unlike manufactured vessels, after being emptied of the blood, retain no colouring-matter, the membranes, even after several days, showed neither imbibition with blood-colouring matter, nor any trace of coagulated fibrine. Thus, by soaking in salt-solution, a property of the blood-vessels was imparted to the fish-bladders and parchment-tubes.

It can hardly be doubted, then, that while, on the one hand, lack of adhesion prevents blood from coagulating, so, on the other, the presence of adhesion gives the impulse to coagulation.

INOCULATION AS A PRESERVATIVE AGAINST CONSUMPTION

M. VERNEUIL has lately published a letter to the editor of the *Gazette hebdomadaire*, M. Lereboullet, in which he proposes to set on foot an experimental inquiry into the possibility of finding some method of "attenuating" the presumed *virus* of tubercle, so as to make inoculation therewith practically useful against consumption, either as a prophylactic measure, like vaccination against small-pox, or as a means of cure, like Pasteur's inoculations in hydrophobia.

Three thousand francs have already been subscribed, and the respectable names of Cornil, Bouchard, Damaschino, and Potain are mentioned among those who approve of the investigation.

It must however be remembered (1) that with the exception of hydrophobia, an exception still on trial, no human disease but small-pox is known which can be prevented by inoculation; (2) that of epizootic diseases

¹ By Ernst Freund, in *Wiener medicinische Jahrbücher*, 1885, Heft 1.

anthrax is only in certain cases guarded against by Pasteur's attenuated virus; (3) that the dependence of consumption on Koch's *Bacillus tuberculosis* is far from established; (4) that its fatality is very far below that of small-pox or hydrophobia, and its treatment far more successful.

Consumption is the most important disease of temperate climates, both by its prevalence, its mortality, and its incidence on young adults; so that the sacrifice of a few rabbits or cats for even a remote chance of controlling its ravages is well justified. But the chance is, we fear, remote.

NOTES

THE friends and former students of Prof. P. J. Van Beneden, of Louvain, are about to celebrate there the fiftieth year of his professorship. Since the year 1836 this distinguished *savant* has occupied the position of Professor of Zoology at the Louvain University, and it is proposed to present him, on the occasion of his jubilee, with a gold medal bearing his portrait. After half a century of teaching and the accomplishment of a vast amount of other work, Prof. Van Beneden still remains fresh in mind and body. His writings have embraced with equal success various branches of biological science, and have gained for him a reputation of the first rank, which has just been crowned by the award of the Cuvier Prize by the Academy of Sciences of Paris. There is no doubt that the proposed demonstration to honour Prof. Van Beneden on his jubilee will find a ready echo in this country, where he possesses numerous friends.

In a recent debate in the French Chamber of Deputies on a Bill permitting any person by will to regulate the conditions of his funeral, a clause was added at the instance of M. de Mortillet, the eminent anthropologist, enabling any person to dispose of his body in favour of educational or learned societies. M. de Mortillet stated that the Autopsy Society founded by Broca had been allowed to retain the brains of Gambetta, Dr. Bertillon, and two journalists, but the authorities might at any time take these away from its museum, as also any bones or skeletons. The proposition was adopted by 268 votes to 198.

WE are glad to receive a copy of the *Annual Companion to the "Observatory."* Its object is to give, in a collected form, the whole of those Ephemerides which have hitherto been printed month by month in the *Observatory*. This issue is regarded as an experiment, and the editors ask for suggestions for the improvement of future *Companions*, and for criticisms on the present one. In future it is intended to issue it with the December number or before. The principal sources from whence the Ephemerides have been derived are as follows:—The "Meteor Notes" have been taken principally from the valuable series of papers by Mr. Denning in vols. i., ii., and iii. of the *Observatory*, supplemented from the British Association Reports. Mr. Denning has also kindly revised them. The Ephemerides for the physical observations of Jupiter and Mars are derived by permission from those calculated by Mr. Marth, and published by the Council of the Royal Astronomical Society in the *Monthly Notices*. The Ephemerides for the satellites of Mars, Saturn, Uranus, and Neptune are taken from the *American Nautical Almanac*, corrected, in some cases, for recent observations made at Greenwich. The elements of occultations and times of eclipses of Jupiter's satellites are extracted from the *English Nautical Almanac*. The Catalogue and Ephemerides of Variable Stars are derived from the *Annuaire du Bureau des Longitudes*. The publication will certainly be of much practical value.

ON the evening of Wednesday, February 17, Prof. A. B. W. Kennedy and the Committee of the Engineering Society held a

successful *soirée* at University College, London, in connection with the College Society. Visitors were received in the engineering laboratory, where machinery was in motion, and Mr. A. S. Ashcroft's autographic stress diagram apparatus was shown in action. All the available space was occupied with exhibits. The College Society organised a show of photographs and photographic apparatus in the library, where Messrs. Clarke and Clarke exhibited their method of printing by gaslight. The *soirée* was attended by about 1000 visitors.

LAST autumn the run of salmon up most of our rivers, especially those falling into the North Sea, was quite unprecedented. It is worthy of notice that at the same time (that is from August to November) they ascended, in equal, if not still more remarkable numbers, the rivers that flow into the North Pacific Ocean, as well on the Japan side as the American. The "canning companies" in British Columbia were quite unable to obtain boxes and barrels quickly enough to keep pace with the supply, and fine large fish were sold for a cent apiece. Had this abundance of the Salmonidæ (sea-trout and bull-trout were as numerous in proportion as salmon) been confined to this part of the world, one might have supposed that an epidemic amongst dog-fish had enabled a much greater number of smolts to escape at the mouths of the rivers on their descent than commonly do; but under the circumstances some more satisfactory explanation seems to be required. Possibly in some manner the quantity of ice in northern waters on both sides of America had an influence upon these fish, or those that prey upon them in the deep water.

THE Italian Ministry of Agriculture has just undertaken an interesting experiment. Half a million of fish eggs were artificially hatched, and the young brood has been distributed all over the centre of the Lake of Como. If the experiment succeeds fairly well, it will be taken up on a large scale, and the department will undertake the re-stocking of the Italian waters. Efforts will be made immediately to revive and extend the rearing of lobsters.

THE old Tour St. Jacques la Boucherie, Paris, celebrated in connection with Pascal's experiments on atmospheric pressure, is now the site of a Laboratory of Physics. The inauguration took place on January 13. The tower was lighted by incandescent lamps.

LARGE sulphur deposits are reported to have been recently discovered on the southern slopes of the Caucasus.

ECUADOR was visited by natural calamities during January, which probably have been the cause of great loss of life. On January 12 the sky in and around Guayaquil was of a dark red colour, as if coloured by an immense conflagration. Detonations heard in the direction of Cotopaxi, and accompanied by earthquakes and subterranean noises, showed that some volcanic eruption was in progress. The noise and shocks lasted for two days and nights. At Yaguachi, opposite Guayaquil, a rain of ashes was observed. It is feared that the town of Latacunga, which is situated at the foot of Cotopaxi, is destroyed.

A REMARKABLE effect of lightning has been recently reported by Prof. L. Weber in a German serial. At Ribnitz, in Mecklenburg, during a violent thunderstorm, with rain and hail, about 6 a.m., the lower pane of a window on the first floor was broken by lightning, and a jet of water was thrown upwards through the aperture to the ceiling, where it detached part of the ceiling, and this, falling with the water, broke a small cigar-table below. Three bucketfuls of water were afterwards taken from the room. The hole in the window was like that from a bullet, and there were radial cracks. The path of the lightning is not very clear, but that it passed through the glass could not be doubted. Some cigars on the table, it may be mentioned, were